REMARKS

Applicants have canceled claim 2 and added the limitations of canceled claim 2 to claim 1. Further, Applicants have canceled claim 4 and added the limitation of canceled claim 4 to claim 3. Accordingly, claims 1, 3 and 5-14 are pending.

Applicants submit herewith a Request for Continued Examination since the claims have been amended and the application is under final rejection. The Request for Continued Examination is submitted to ensure entry of the foregoing amendments and in order to advance prosecution of the application.

The claims stand rejected under 35 U.S.C. 103(e) as being unpatentable over Moriyama (claim 1-10) in view of Ishida, U.S. Patent No. 6,329,065 (claim 11), and further in view of Wolf et al, U.S. Patent No. 6,195,260 (claims 12 and 14). Further, claim 13 is rejected over the Moriyama and Ishida combination, further in view of Zakel et al, U.S. Patent No. 5,989,993.

Each of the rejections in the Office Action rely upon the primary reference to Moriyama. The Examiner recognizes that Moriyama does not explicitly teach the claimed elastic

insulative (silicone or epoxy) resin having a modulus of elasticity of 1 - 200 MPa at a temperature of 150°C, however the Examiner takes the position that the effectiveness of controlling the modulus of elasticity flows naturally from the disclosure of the resin as set forth in the reference. Applicants traverse the rejections and request reconsideration in view of the foregoing amendments and for the following reasons.

According to the present invention, the surface mounted parts, such as semiconductor chips, are mounted on a first substrate, such as a wiring substrate or module substrate by first soldering, for example as shown in the module assembly steps of Fig. 15(a). Specifically, the module assembly steps of Fig. 15(a) include the mounting of the parts, the soldering of the parts (reflow) and the application of a resin for covering the mounted parts, such as with a silicone resin or low elasticity epoxy resin. Then, the substrate is divided into modules 1, as shown in Fig. 9(c) (step S9 of Fig. 15(a)).

Thereafter, in a secondary mounting step, the module 1 is mounted on a printed wiring substrate 16, as shown in Fig. 10. That is, the module (device) is mounted to another substrate in a reflow step S24, which is shown as one of the module

secondary mounting steps of Fig. 15(b). In the reflow in the secondary mounting procedure, the internal solder connection portions can be re-melted by the heat of the soldering. The solder re-melting expansion pressure 9 in the solder connection portion 18b (Fig. 16) increases to become higher than the resin pressure 19 if the resin is of a high hardness type, which is typically used. This can cause defoliation at the boundary between the resin 20 and the chip 18 so a solder flow out 10 is formed in the gap as shown in Figs. 16 and 17, resulting in a short-circuit failure. However, by using a low elasticity resin having a modulus of elasticity of 1 to 200 MPa at a temperature of 150°, the pressure caused by the melting expansion of the solder can be moderated and as a result the occurrence of short circuits between the connection terminals in the surface mounted parts can be avoided.

Each of independent claims 1, 5, 8 and 9 has been amended to distinguish between the first and second soldering of the invention in order to emphasize the significance of the resin having the claimed range of modulus of elasticity that is used in sealing the surface mounted parts that are mounted on the first substrate or wiring substrate by the first soldering. That is, when the semiconductor device of the present

invention is mounted on a second substrate by second soldering, the resin, as a result of the claimed modulus of elasticity taught by the present invention, moderates the adverse effects caused by the melting expansion of solder connections, which is not suggested or appreciated by the art relied upon in the rejections of the claims.

Specifically, Moriyama merely discloses an epoxy or silicone resin for sealing a module without disclosing the modulus of elasticity of the resin or the effect that the hardness of the resin has in the secondary mounting step of the module when solder connections are remelted causing expansion pressure. Applicants agree with the Examiner that the sealing resin disclosed by Moriyama et al inherently has a modulus of elasticity. Further, silicone resins are known to have a wide range of moduli of elasticity. However, the art of record does not suggest that the modulus of elasticity of the silicone encapsulating resin of Moriyama et al will effect the connections of the chip parts mounted on the wiring substrate due to solder flow when the module is subjected to secondary mounting reflow, as in the present invention.

Applicants respectfully assert that the art of record does not teach that the modulus of elasticity of the elastic

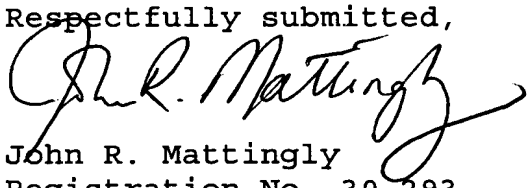
insulative resin that is claimed is a result effective variable. Accordingly, although Applicants' claimed invention includes an optimum range of the modulus of elasticity for the claimed elastic insulative resins, this variable is not identified in the prior art as being one that is controlled in order to minimize adverse short circuiting that occurs when a module sealed with the resin is subjected to secondary (reflow) soldering, as described in the present invention. As set forth in *In re* Antonie, 559 F.2d 618, 620, 195 USPQ 6 (CCPA 1997), the discovery of an optimum value of a result effective variable is ordinarily considered to be within the skill of the art, however, an exception to the rule exists when the parameter optimized is not recognized to be a result effective-variable. Here, the claimed range represents an optimum range of the modulus of elasticity for the elastic insulative resin (silicone or epoxy resin), and the optimization of this variable is not recognized in the art to be a result-effective variable with respect to minimizing flow out of solder during mounting of the module by second soldering (reflow) to another substrate.

Therefore, the differences between Moriyama et al and the claimed invention are not obvious to one having ordinary skill

in the art. Further, none of Ishida et al, Zakel et al and Wolf et al suggest to one having ordinary skill in the art the claimed elastic insulative resin. Accordingly, the rejections under 35 U.S.C. § 103 should be withdrawn.

In view of the foregoing amendments and remarks, reconsideration and reexamination are respectfully requested.

Respectfully submitted,



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